National Institute of Environmental Health Sciences

Food chains in freshwaters

Author(s): Sabo JL, Finlay JC, Post DM
Year: 2009
Journal: Annals of The New York Academy of Sciences. 1162: 187-220

Abstract:

There are three hypothesized controls on food-chain length (FCL): energy supply (or "resource availability"), ecosystem size and disturbance (or "environmental variation"). In this article, the evidence for controls on FCL in freshwater ecosystems is evaluated. First, the various ways FCL can be measured are defined. Food-chain length typically is estimated as (1) connectance-based FCL--an average connectance between basal resources and top consumers, (2) functional FCL--by experimental determination of functionally significant effects of a top predator on lower trophic-level biomass patterns, and (3) realized FCL--an average connectance measure weighted by energy flow between basal consumers and the consumer occupying the maximum trophic position in the food web. Second, all evidence for relationships between the three hypothetical controls and FCL in freshwater ecosystems are evaluated. The review includes studies from streams, lakes, ponds, wetlands, phytotelmata, and experimental containers. Surprisingly, few studies of FCL in freshwaters that test the same suite of controls using the same methods are found. Equally compelling results arise from case studies based on functional, realized, and connectance-based measures of FCL. Third, 10 rules of thumb that could increase similarity of future studies, thereby facilitating synthesis across systems, are suggested. Fourth, it is discussed how FCL influences the concentration of contaminants in large-bodied animals (many of which are consumed by humans) as well as the efficacy of biocontrol applications in agriculture. Finally, there is a discussion of the potential relationships between global climate change, hydrology, and FCL in freshwaters.

Source: http://dx.doi.org/10.1111/j.1749-6632.2009.04445.x

Resource Description

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

audience to whom the resource is directed

Researcher

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event, Food/Water Security, Temperature

Extreme Weather Event: Drought, Flooding

Food/Water Security: Fisheries

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

Freshwater

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Intervention:

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type:

format or standard characteristic of resource

Review

Resilience:

capacity of an individual, community, or institution to dynamically and effectively respond or adapt to shifting climate impact circumstances while continuing to function

A focus of content

Timescale:

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

Climate Change and Human Health Literature Portal

A focus of content